

REMARKS

This is intended as a full and complete response to the Office Action dated July 12, 2005, having a shortened statutory period for response set to expire on October 12, 2005. Claims 1-19 remain pending in the application and are shown above. Claims 1-19 are rejected by the Examiner. Reconsideration of the rejected claims is requested for reasons presented below.

Claim Rejections – 35 U.S.C. § 102(e)

Claim 1 is rejected under 35 U.S.C. § 102(e) as being anticipated by *Sun et al.* (U.S. Patent No. 6,299,741). The Examiner asserts that *Sun et al.* discloses the subject matter as described in claim 1. Applicants respectfully traverse this rejection

Sun et al. discloses an electrolytic polishing method with a potential differential is applied to the anode and cathode. *Sun et al.* also discloses applying multiple potentials to the anode and cathode in alternating positive and negative potentials.

Sun et al. does not teach, show, or suggest providing an electrically conductive solution and an electrode in contact with the electrically conductive solution, (b) disposing a polishing medium in contact with the electrically conductive solution, (c) positioning a substrate having a conductive material formed thereon against the polishing medium so that a surface of the substrate contacts the electrically conductive solution and the polishing medium, (d) applying a first positive potential between the polishing medium and the electrode for a first time period to remove conductive material from the substrate, and (e) applying a second positive potential between the polishing medium and the electrode for a second time period to remove conductive material from the substrate, wherein the second potential is lower than the first potential, as recited in claim 1. Withdrawal of the rejection is respectfully requested.

Claim Rejections – 35 U.S.C. § 103

Claims 1-10 and 15 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Uzoh et al.* (U.S. Patent No. 5,807,165) in view of *Lewy* (U. S. Patent No. 5,135,625). The Examiner asserts that it would have been obvious to one of ordinary skill in the art to modify the method of *Uzoh et al.* by containing the basin or container of *Lewy*. Applicants respectfully traverse this rejection.

Uzoh et al. discloses a method of planarizing a layer of a workpiece such as a semiconductor wafer that includes rotating the layer against an electrolytic polishing slurry and flowing an electrical current through the slurry and through only one major side and/or minor sides of the layer, to remove portions of the layer, and the electrical current is a pulsed anodic and zero potential polarity or alternating polarity.

Lewy discloses a method for polishing the inner surface of a metallic tubing using a cycling dc current between applying the current and applying no current. The apparatus of *Lewy* further comprises a container for retaining electrolytic solution and pump means for circulating the electrolytic solution from the container through the metallic tubing to be cleaned. There is no suggestion or motivation in either *Uzoh et al.* or *Lewy* to combine the metal tubing cleaning process of *Lewy* with the planarization process of *Uzoh et al.*

The combination of *Uzoh et al.* and *Lewy* does not teach, show or suggest providing an electrically conductive solution and an electrode in contact with the electrically conductive solution, (b) disposing a polishing medium in contact with the electrically conductive solution, (c) positioning a substrate having a conductive material formed thereon against the polishing medium so that a surface of the substrate contacts the electrically conductive solution and the polishing medium, (d) applying a first positive potential between the polishing medium and the electrode for a first time period to remove conductive material from the substrate, and (e) applying a second positive potential between the polishing medium and the electrode for a second time period to remove conductive material from the

substrate, wherein the second potential is lower than the first potential, as recited in claim 1, and claims dependent thereon.

With regard to claims 8 and 9, *Uzoh et al.* does not suggest or motivate positive potentials modulated within a predefined range of potentials. Withdrawal of the rejection to claim 1 and claims dependent thereon is respectfully requested.

Claims 11-14 and 16-18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Uzoh et al.* in view of *Lewy* as applied to claim 1 above, further in view of *Kuwabara et al.* (U.S. Patent No. 4,956,060). The Examiner asserts that it would have been obvious to one of ordinary skill in the art to modify the method of *Uzoh et al.* in view of *Lewy* by applying the third and fourth pulsed potentials as disclosed by *Kuwabara et al.* Applicants respectfully traverse this rejection.

Uzoh et al. and *Lewy* are described above. *Kuwabara et al.* discloses an apparatus for electro-chemical machining by supplying a pulse of predetermined current density, detecting the corresponding current of the pulse, comparing the detected current with the current set in advance, and then increasing or decreasing the current density of the pulse until the corresponding current it matches the current set in advance.

Claims 11-12 have been amended and Applicants believe the rejection of *Uzoh et al.* in view of *Lewy*, and further in view of *Kuwabara et al.* is moot. Withdrawal of the rejection to claims 11-12 is respectfully requested.

There is no suggestion or motivation in *Uzoh et al.*, *Lewy*, and *Kuwabara et al.* to combine the current density feedback loop of *Kuwabara et al.* with the metal tubing cleaning process of *Lewy* and the planarization process of *Uzoh et al.*

The combination of *Uzoh et al.*, *Lewy*, and *Kuwabara et al.* does not teach, show or suggest providing an electrically conductive solution and an electrode in contact with the electrically conductive solution, (b) disposing a polishing medium in contact with the electrically conductive solution, (c) positioning a substrate having a conductive material formed thereon against the polishing medium so that a surface of the substrate contacts the electrically conductive solution and the polishing medium, (d) applying a first positive potential between the polishing medium and the electrode for a first time period to remove conductive material

from the substrate, and (e) applying a second positive potential between the polishing medium and the electrode for a second time period to remove conductive material from the substrate, wherein the second potential is lower than the first potential, and further comprising applying a third potential between the polishing medium and the electrode for a third time period, and the third potential is a zero potential as recited in claim 13. Withdrawal of the rejection is respectfully requested.

The combination of *Uzoh et al.*, *Lewy*, and *Kuwabara et al.* does not teach, show or suggest providing an electrically conductive solution and an electrode in contact with the electrically conductive solution, (b) disposing a polishing medium in contact with the electrically conductive solution, (c) positioning a substrate having a conductive material formed thereon against the polishing medium so that a surface of the substrate contacts the electrically conductive solution and the polishing medium, (d) applying a first positive potential between the polishing medium and the electrode for a first time period to remove conductive material from the substrate, and (e) applying a second positive potential between the polishing medium and the electrode for a second time period to remove conductive material from the substrate, wherein the second potential is lower than the first potential, and further comprising applying a third positive potential between the polishing medium and the electrode for a third time period as recited in claim 16, and claims dependent thereon. Withdrawal of the rejection is respectfully requested.

Claim 19 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Uzoh et al.* in view of *Lewy* as applied to claim 1 above, further in view of *Kilcher et al.* (U.S. Patent No. 4,655,888). The Examiner asserts that it would have been obvious to one of ordinary skill in the art to modify the method of *Uzoh et al.* in view of *Lewy* by applying the third and fourth pulsed potentials as disclosed by *Kilcher et al.* Applicants respectfully traverse this rejection.

Uzoh et al. and *Lewy* are described above. *Kilcher et al.* discloses electroerosive machining of workpieces by a pulse-like d.c. voltage applied

between the workpiece and the electrode, and the pulse is between an amplitude and a zero potential with the pulses have successively rising amplitudes.

There is no suggestion or motivation in *Uzoh et al.*, *Lewy*, and *Kilcher et al.* to combine the increasing amplitude pulse-like d.c. voltage application of *Kilcher et al.* with the metal tubing cleaning process of *Lewy* and the planarization process of *Uzoh et al.*

The combination of *Uzoh et al.*, *Lewy*, and *Kilcher et al.* does not teach, show or suggest providing an electrically conductive solution and an electrode in contact with the electrically conductive solution, (b) disposing a polishing medium in contact with the electrically conductive solution, (c) positioning a substrate having a conductive material formed thereon against the polishing medium so that a surface of the substrate contacts the electrically conductive solution and the polishing medium, (d) applying a first positive potential between the polishing medium and the electrode for a first time period to remove conductive material from the substrate, and (e) applying a second positive potential between the polishing medium and the electrode for a second time period to remove conductive material from the substrate, wherein the second potential is lower than the first potential, and further comprising (f) applying a third positive or zero potential between the polishing medium and the electrode for a third time period and repeating steps (d) through (f) for a period of time as recited in claim 19. Withdrawal of the rejection is respectfully requested.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

The secondary references made of record are noted. However, it is believed that the secondary references are no more pertinent to the Applicant's disclosure than the primary references cited in the office action. Therefore, Applicant believes that a detailed discussion of the secondary references is not necessary for a full and complete response to this office action.

Having addressed all issues set out in the office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



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